Green Cities

Rethinking Tomorrow's Urbanism…

Introduction

- The world has made inroads into discussions on "Green Buildings"
- Since then, norms & standards have been developed on Green Building Mechanisms
- Now, with challenges of modern habitats, we must expand our scope to create "Green Cities"
- Our cities of tomorrow have to be highly sustainable living habitats, that improve standards of human living, in a world compounded by enormous infrastructural and consumption demands.

Intro (contd.)…

- By the end of this presentation, we hope to conclude on certain aspects of what Green Cities should aspire to be, and what our roles, as Architects, Planners, Engineers and members of the building industry, should comprise of, to ensure its success.
- For designing our cities of tomorrow, we must look at our past & present scenarios.
- We must look at a holistic approach of city planning, and come up with a comprehensive strategy towards developing a new urbanism.

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  - Nanded City, Pune
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Definitions

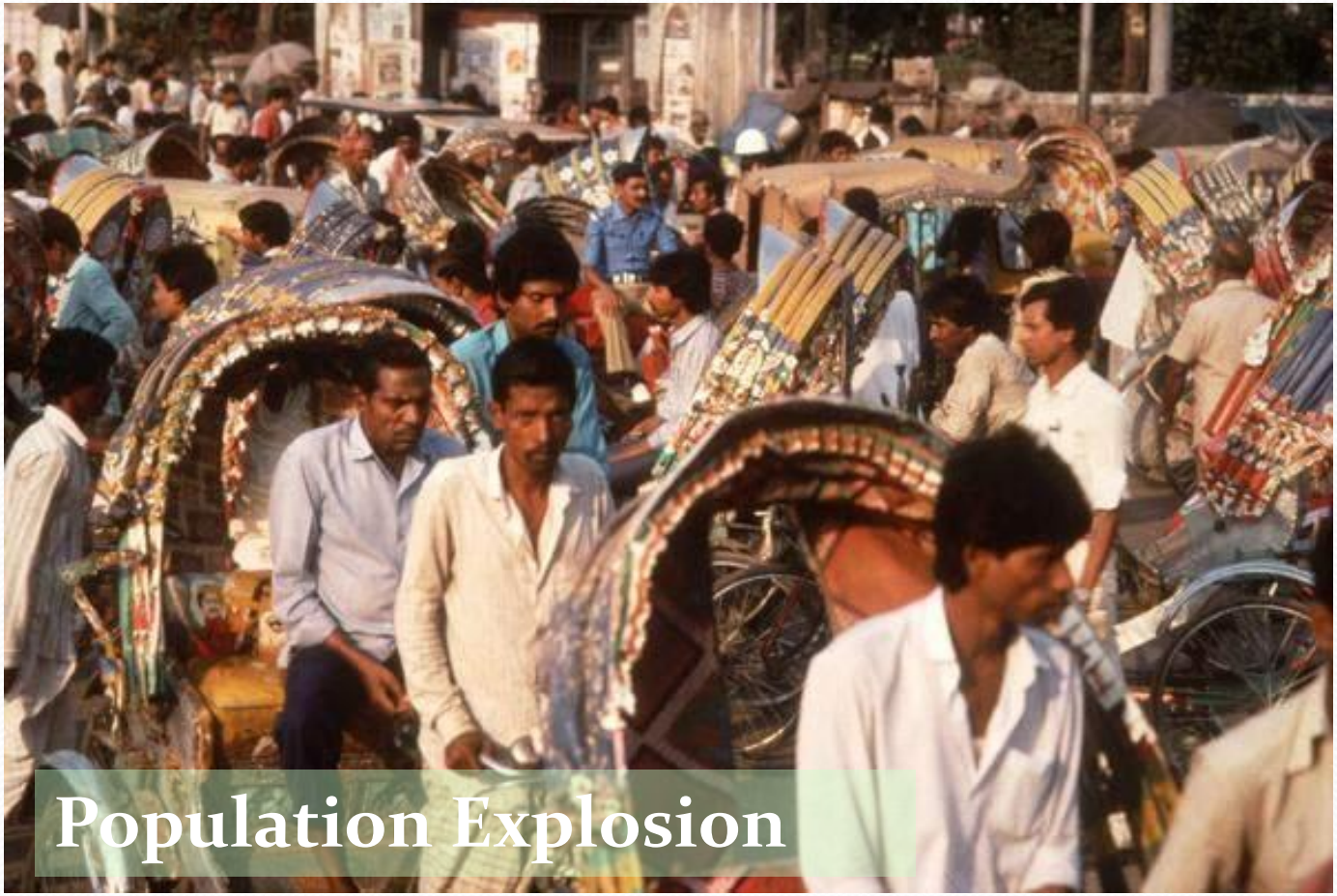
- "GREEN":
  - Environmentally sound or beneficial
  - Sustainable & Energy efficient
  - Lush in vegetation & greenery – Trees & city lungs
  - Full of life
- "CITY":
  - Human settlement of at least 50,000 population with more than 75% of them involved in non-agricultural produce & livelihood

Definitions

"A '<u>Green City</u>' can thus be defined as a futuristic urban habitation, that is sustainable as an urban eco-system, making optimum use of resources, and making a substantially positive impact on our global built & natural environment, by a better quality of life, high ratio of greenery and quite importantly – with maximum efficiency in regards to overall energy use."

This is not an utopian idea, it is an attainable target, that many of our fraternity are actually involved in.

Present Scenario: India



Present Scenario: India

Expanding Vehicular Traffic

Present Scenario: India

Urban Pollution

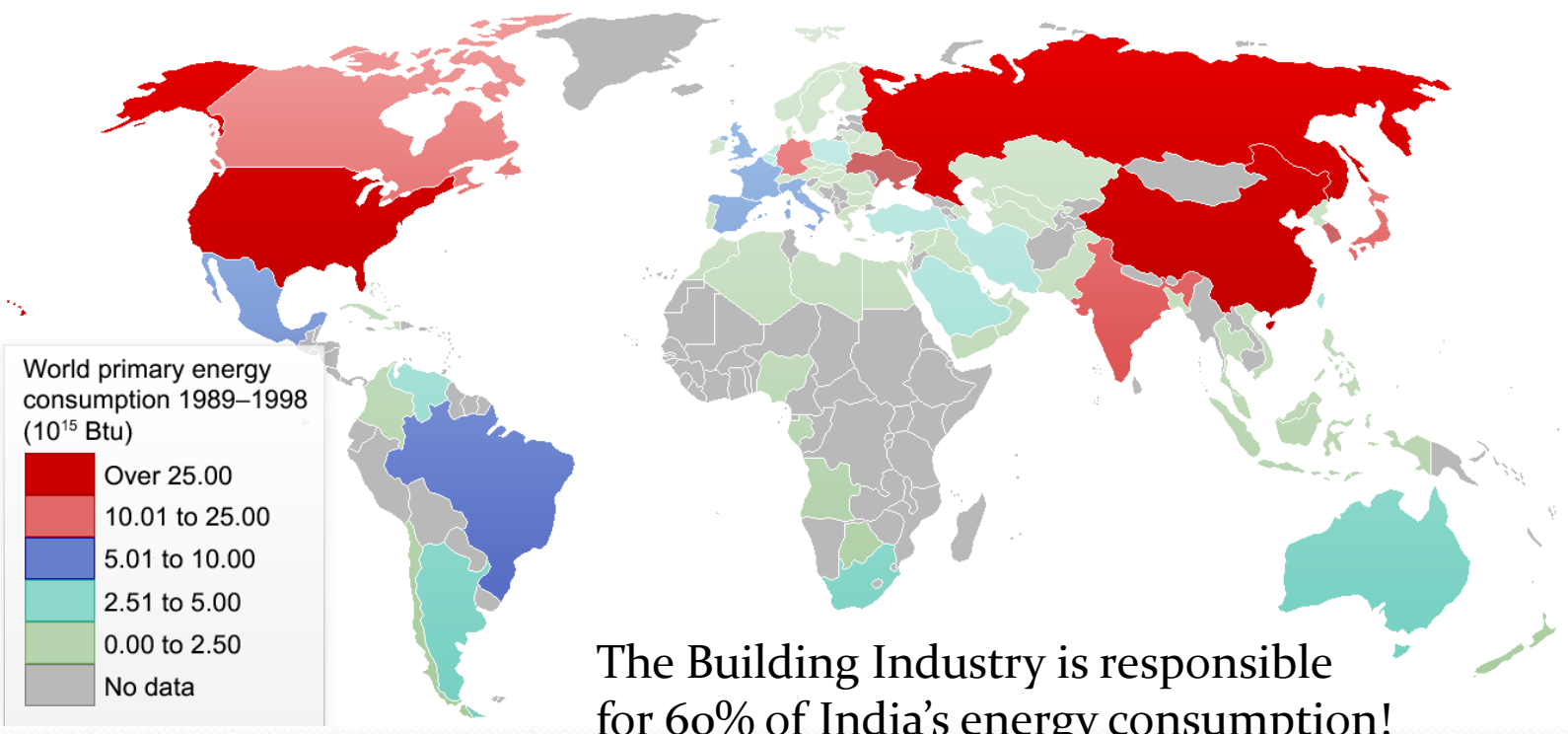
Present Scenario: India

Poverty & Poor Health

Present Scenario: India

Migration & Unemployment

Present Scenario: India

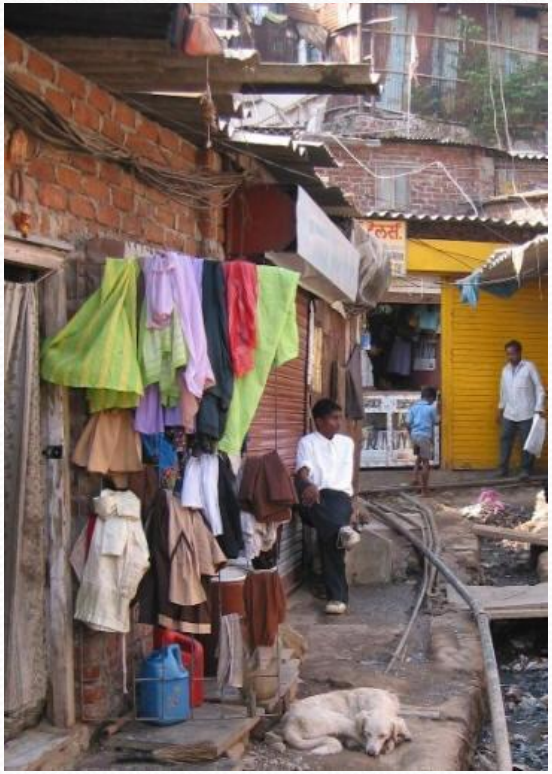


The Building Industry is responsible for 60% of India's energy consumption!

High Energy Consumption

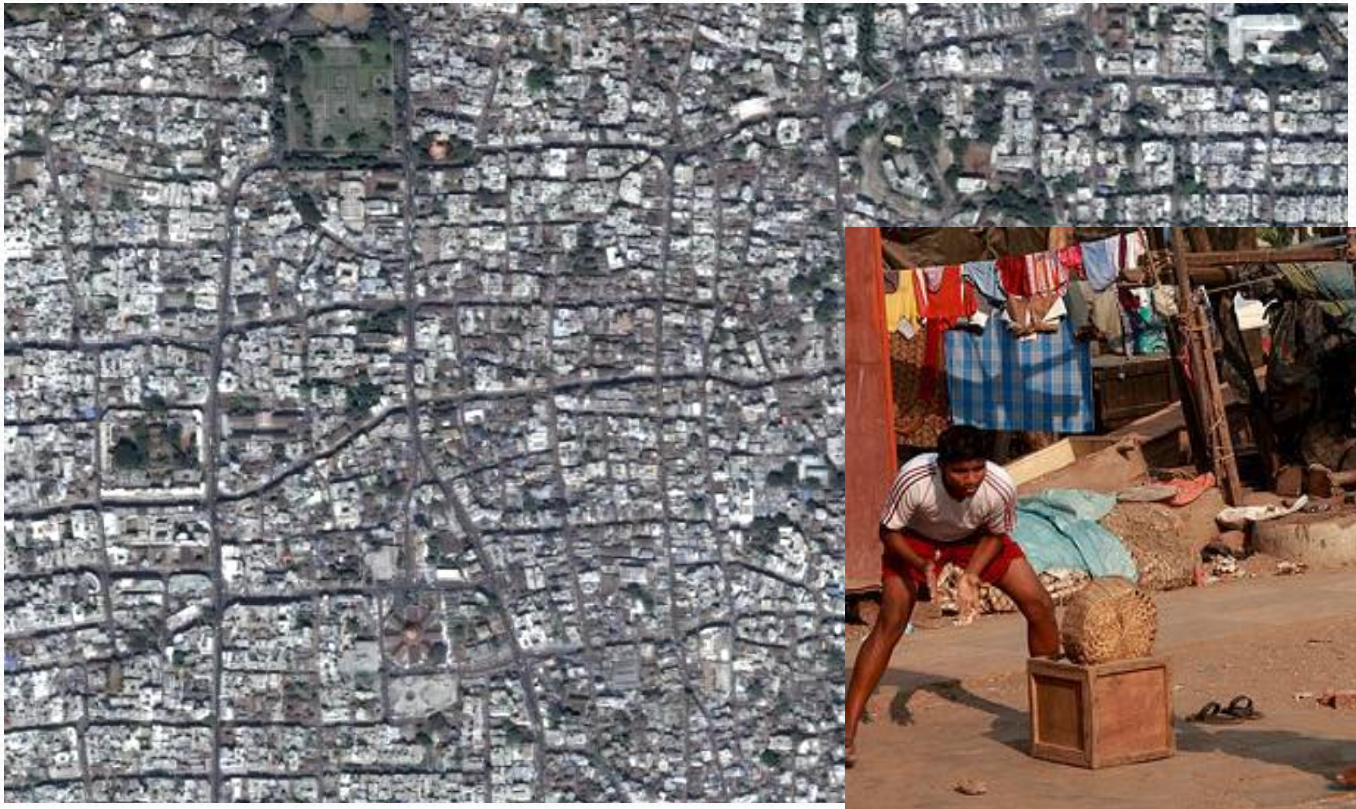
Source: International Energy Agency (IEA)

Present Scenario: India



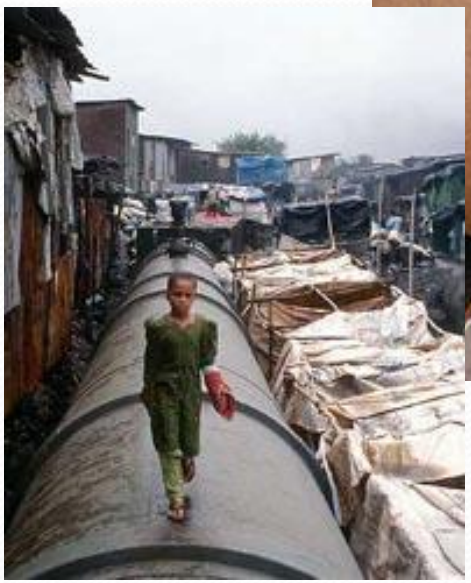
Low Standard of Living

Present Scenario: India



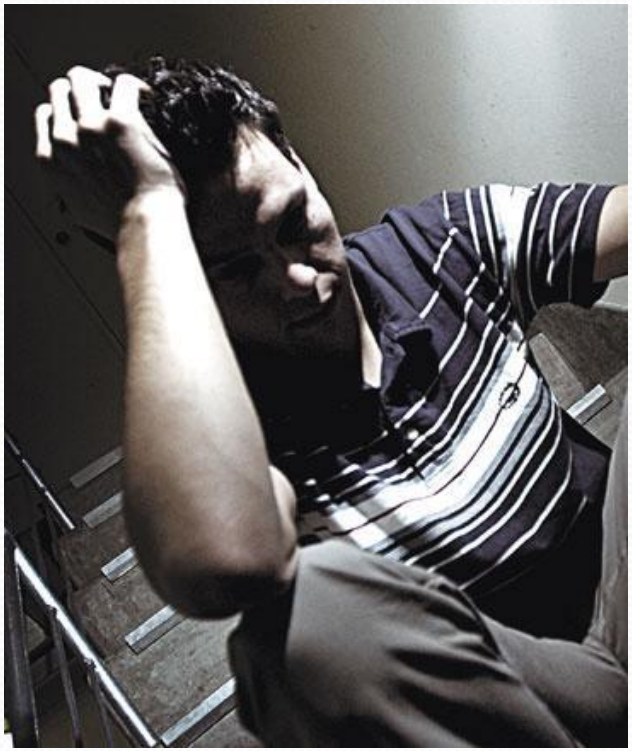
Lack of Greenery

Present Scenario: India



Low Access to Basic City Infrastructure

Present Scenario: India



Urban Depression / Stress / Anxiety / Anger

Present Scenario: India

Crime: Lack of Security

Present Scenario: India

- India's urban reality is grimmer than we would like!
- The problems & challenges are many and complex, and the solutions can only lie in a comprehensive strategy to look at our cities afresh
- While we may look up and about at shining examples in the West, we must understand that the situation is very different in India, and the solutions have to be indigenous
- Poverty, Migration, lack of affordable Housing, low quality of City life, etc. are all concerns on the rapid rate of urbanisation that India is in.

Present Scenario: India

- SOME FACTS:
  - Although cities occupy just 2%of the Earth's surface, their inhabitants use 75% of the planet's natural resources while contributing more than half to the total economy. On average, urban dwellers earn higher wages & live healthier, easier lives than their rural counterparts.
  - The State of World Population 1999, issued by the United Nations Population Fund, reports that 61 percent of the world's population will be city dwellers by 2030. In India, as per 2001 census, it is expected that at least **50% of the population of India will be urbanised by 2030.**

Present Scenario: India

- SOME FACTS:
  - Our very own **Maharashtra** is the most urbanised state with **44% of its population living in cities** – a total of 41 million!
  - Water supply in India is **40-50%** of demand
  - According to official figures, **43%** of urban households are without latrines or connections to septic tanks or sewerage.
  - Out of 300 Class 1 cities, 70 have partial sewerage systems & treatment facilities. **Only 30% wastewater is treated.**
  - According to a recent study, water and sanitation-related diseases, originating from poor hygiene conditions in human settlements, account for upto 60%of the total number of diseases in most Indian states.

Present Scenario: India

- SOME FACTS:
  - Inadequate housing stock and increase in the number of slums have added to environmental concerns in urban areas. The shortage of housing in urban areas at the beginning of the Tenth Plan is estimated at **8.9 million units**. The 2001 Census shows that the number of slum-dwellers has risen to 40.6 million

Planning Aspects of Green Cities:

- **Physical Infrastructure:**
  - Water Supply & Distribution
    - Every citizen has the right to access of clean, potable drinking water, and also water for cleaning & washing purposes.
    - Green Cities will supply clean water by taps to all households, and have a systematic and maintenance friendly distribution.
    - Water would be recycled to ensure sustainable practices, including Ground Water Recharge, irrigation, treatment for use in Class II & III water – flushing, car-wash, etc.
    - Considering India's precarious water health situation, it would be best practice to have high quality water treatment facilities.

Planning Aspects of Green Cities:

- **Physical Infrastructure:**
  - Sewerage & Surface Drainage
    - 80-90% of all water consumed constitutes total sewage flow
    - Potable & flushing water can be segregated, and almost all can be recycled for use in flushing, irrigation and other purposes.
    - Urban landscaping takes a toll on water requirements of the city. This can easily be met by recycling sewage water.
    - Excess treated water can be pitted to recharge ground water resources.
    - Sewage Treatment should be decentralised – DEWATS
    - High water quality treatment to ensure universally acceptable low BOD.

Planning Aspects of Green Cities:

- **Physical Infrastructure:**
  - Solid Waste Management
    - Proper segregation of solid waste for recycling – 1) Organic, 2) Inorganic – Recyclable (Glass, Metal, Plastics)
    - Hierarchy of Disposal systems – from Home / Office (source), to Secondary Storage Units, to Segregations Bins, to City level storage and disposal (landfill / incineration)
    - Use of clean technology and processes to minimise chance of stench, pollution & stray animals – proper hygiene conditions
    - Hybrid, low-energy use of available manpower & machines
    - Bio-Hazardous waste (medical) to be incinerated

Planning Aspects of Green Cities:

- **Physical Infrastructure:**
  - Electricity Supply & Distribution
    - Use of Green energy sources to minimise use of traditional fossil fuels in electricity generation – Solar Water Heater, Photo-Voltaic Cells, Windmills, Hydro-Electricity, Tidal Electricity, Bio-Fuels (Bio-Gas & waste Liquid fuels), etc.
    - Efficient distribution system to minimise distribution loss
    - Lower consumption through effective public campaigning, use of low-energy CFLs (as opposed to incandescent lamps), better building design to ensure lower AC loads, lower need of artificial lighting by designing better passive light sources, etc.

Planning Aspects of Green Cities:

- **Physical Infrastructure:**
  - Intelligent City Resource Management System
    - Smart City concept – present technology, software (building management software) and human backup intelligence is adequate to ensure maximum efficiency of city services in production & management.
    - "E-Governance" can reduce functional loss by upto 30% which has a tremendous impact on resources used, including human resource.

Planning Aspects of Green Cities:

- **Social Infrastructure:**
  - Education - Schools / Colleges / Advanced Learning
    - Learning centres have to be easily accessible in a well-distributed manner to ensure maximum outreach
    - Schools as centres of intellectual, physical & spiritual enhancement
    - Knowledge themes to prepare for future needs of our country and the world
  - Health Facilities
    - Good, accessible& affordable medical facilities to diagnose, treat, and thus ensure better health of its citizens

Planning Aspects of Green Cities:

- **Social Infrastructure:**
  - Public Utilities & Amenities
    - "Barrier-Free" access to city amenities – shopping, local authorities, police, fire station, transit terminals, etc.
    - Public facilities – drinking water, toilets
    - Well integrated bus/auto/taxi/rail/air terminals
    - Decentralised recreation and assembly facilities
    - Non-interfering, community-involved spiritual structures
    - Public greens
    - Eco-friendly cremation & burial arrangements

Planning Aspects of Green Cities:

- **Health & Livelihood:**
  - A healthy society is a happy one, and is able to give maximum social & economic input to its city.
  - Quality of Life aspirations must be high – measured by higher per capita income, access to livelihood goods & comforts, educational resources, leisure, safety, cultural resources, social life, physical health, environmental quality issues, etc.
  - Good Work-Play-Learn distribution
  - Green Cities must provide total job opportunities. Good employment revitalises the economic growth of cities. Cities than become magnets of residential development.

Planning Aspects of Green Cities:

- **Greenscapes:**
  - The urban built density in India is alarmingly high. The hierarchy of open spaces, related to population & spread of communities must be properly planned, to ensure high access to greenery & open spaces.
  - Promoting Urban Forests, City Farming, etc.
  - "Family Tree" concept - Planting large trees – at least 1 per household. Family may *adopt* (& maintain) that tree.
  - Providing sports & recreational fields
  - Integrate with existing natural features and eco-systems like water bodies, hills, forests, and others

Planning Aspects of Green Cities:

- **Energy Consumption:**
  - Buildings consume 40% of the total energy consumed by a human society. In total, the building industry consumes upto 60% of the nation's energy requirements (including production of steel, cement, etc.)
  - Green Cities have to be composed of a high percentage of rated "Green Buildings", to ensure an overall low energy consumption of the City.
  - Passive Energy sources (naturally available wind, sunlight, cooling/heating) as opposed to Active Energy sources (electrical powered lights, AC, etc.)

Planning Aspects of Green Cities:

- **Traffic & Transport:**
  - Eco-Friendly transport systems – using CNG, high fuel efficiency, alternate fuels
  - Minimise commuting – reduce need for travel by keeping all needs (work, school, recreation) & amenities easily accessible
  - Better city planning to ensure consistently optimum speed travel, in relatively short duration of time, to achieve better vehicle fuel efficiency.

Planning Aspects of Green Cities:

- **Traffic & Transport:**
  - Promote pedestrian environment "Walk-to-Work", "Walk-to-School"; also cycles
  - Good quality, well-connected Public Transport to ensure that mass-transit is largely taken care of, and energy exhaustive, personal transport is discouraged regularly.

Planning Aspects of Green Cities:

- **Sustainable Urban Design & Green Architecture:**
  - The actual design of the buildings that make the city has tremendous collective impact on the environmental sustainability of the city.
  - Development Control Rules & Urban Design Guidelines may regulate issues like site planning, building heights, setbacks, orientation, design of windows/glazing, building/cladding materials, specifications, etc. to ensure that the collective built environment has minimum negative impact on the overall environment.

Planning Aspects of Green Cities:

- **Sustainable Urban Design & Green Architecture:**
  - There are many eco-friendly materials available in the market now, after extensive R&D. These range from fly-ash bricks, and compressed mud blocks, to crushed (stone) sand, as opposed to diminishing river sand.
  - As Building professionals , it is important to be more responsible in building design & engineering. But for this, we need to update ourselves on new trends in materials, technology and construction to achieve Energy consciousness. Every Green Buildings adds to building a better city.

Planning Aspects of Green Cities:

- **Sustainable Urban Design & Green Architecture:**
  - There are also various accreditation and rating systems that empower various benefits to building projects that have their accepted energy ratings approvals:
    - Eco-Housing Program – Star ratings program implemented in Maharashtra through International Inst. for Energy Conservation
      - The Eco-housing program launched by Pune Municipal Corporation (PMC) promotes the adoption of environmentally friendly practices, energy efficient products, and techniques by the construction industry.
      - 88 measures marked on 1000 total. Rebate of 10-50% on premiums given by PMC depending on Star Ratings achieved. Benefits to Builders and end users.
    - LEED (Leadership in Energy & Environmental Design) India – Ratings by Indian Green Building Council

Case Studies

- **Reykjavik, Iceland:**
  - Iceland plans to unplug itself from all dependence on fossil fuels by 2050 to become a hydrogen economy. Already, Reykjavik (pop = 115,000) gets energy for heat, hot water & electricity entirely from renewable hydropower and geothermal resources. Some vehicles even run on hydrogen, including three city buses.
  - Main Feature – **Clean Energy**

Case Studies

- **<u>Curitiba, Brazil:</u>**
  - With citizens riding a BRTS bus system hailed as one of the world's best, about ¾th of its 1.5 million residents rely on public transport. This mid-sized city boasts over 580 ft^2 of green space per inhabitant. As a result, according to one survey, 99%of Curitibans are happy with their hometown.
  - Main Feature – **Super-effective Transport System**

Case Studies

- **<u>Curitiba, Brazil:</u>**

Major changes implemented by Mayor who is Architect-Planner

Economic development by better Transport Planning.

Master Planner Jamie Lerner – 3 times former Mayor, Curitiba

Case Studies

- **<u>Malmö, Sweden:</u>**
  - Known for its extensive parks and green space, Sweden's 3rd largest city is a model of sustainable urban development.
  - Of population = 2.85 Lakh, 40% pedestrianised, 30% transport by Cycles
  - Uses Green Roofs, Photo Voltaic Energy, Bio-Fuels, Eco-friendly building materials
  - Main Feature – **Eco-friendly Neighborhoods**

Case Studies

- **<u>Barcelona, Spain:</u>**
  - Population = 1.6 million
  - Hailed for its pedestrian-friendliness, promotion of solar energy, and innovative parking strategies, Barcelona is creating a new urban-regeneration plan that also includes poverty reduction and investment in neglected areas, demonstrating a holistic view of sustainability.
  - Main Feature – **Pedestrian Priority; Eco-Friendly City**

Case Studies

- **<u>Kampala, Uganda:</u>**
  - Population = 1.25 Million
  - Set in lush vegetation, city promoted Urban Agriculture to meet city's food needs and provide economic growth at larger level.
  - Meets challenges in developing countries - poverty & pollution
  - Implementing Traffic Congestions fees, and better Public Transport systems
  - Main Feature – **City Farming**

Case Studies

- **New Delhi, India:**
  - NCR Population = 14 Million
  - Indian capital city trying to meet challenges of pollution, migration, traffic, etc.
  - No major metropolis can really be called an Indian Green City.
  - Major lands preserved as forests
  - CNG in Public transport reduces air pollution by 30%
  - City has efficient Ring Roads.
  - Main Feature – **CNG, tree-lined city (urban forests)**

Case Studies

- **Magarpatta, Pune:**
  - Maharashtra and India's first, iconic Integrated Township.
  - High-quality neighbourhoods
  - Eco-friendly materials (fly-ash) and sustainable practices like Solar Heating, garbage segregation, etc.
  - Extensive plantation & open spaces act as breathing "lungs" of the larger city – Oxygen Zone
  - Main Feature – **Sustainable Integrated Township**

Case Studies

- **Magarpatta, Pune:**

STATISTICS:

Population = **50,000**

Total Site Area = **400 Acres**

20 Residential Sectors

Almost **10,000** Units

Distance from Pune City
= 8km (from Station)

25 Parks of 2-3 Acres each

1 City-level park = 25 Acres

16,000 Trees planted

80,000 Shrubs planted

Case Studies

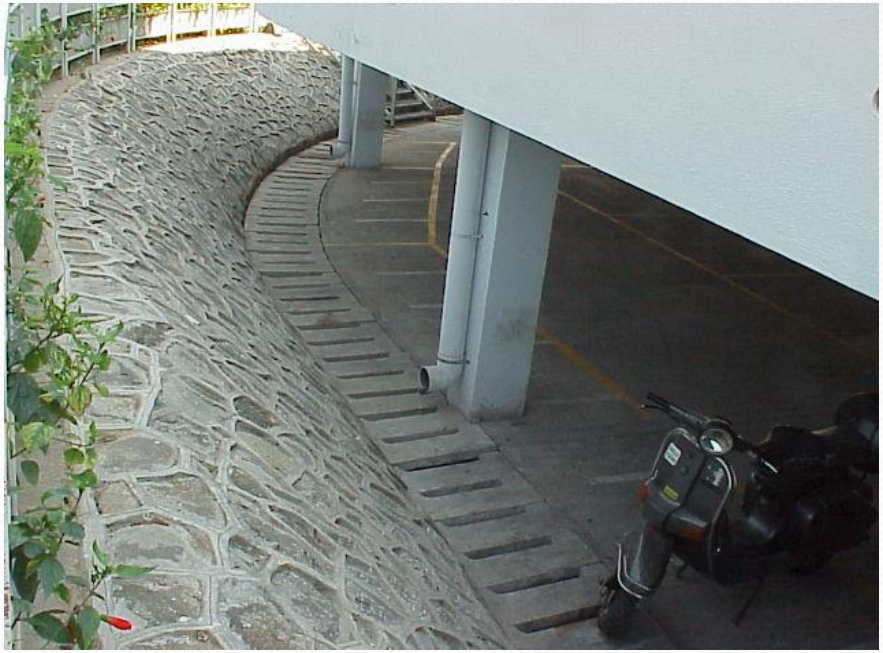
- **<u>Magarpatta, Pune:</u>**
  - As an Integrated Township, the city had to be a self-sustaining & sustainable, having all provisions of Physical & Social infrastructure, total work opportunities, residential options and amenities – <u>Work, Learn, Play & Live</u>
  - Vision was to rethink what our city could be, not a dirty, dense collection of buildings, but a <u>clean, green, living environment</u>

Case Studies

- **<u>Magarpatta, Pune:</u>**
  - Energy Efficiency & Sustainability was an important factor in the conceptualisation of Magarpatta City
    - Solar Water Heaters – the largest collection of Solar Heaters in one project – a Limca Book record
    - Extensive Greening of city
    - Rain Water Harvesting
    - Vermiculture pits
    - Use of Eco-friendly (recycled) materials – like Fly-Ash
    - City Farming

Case Studies

- **Magarpatta, Pune:**



Rain Water Harvesting –
Recharging the groundwater
Utilising surface drainage for irrigation and landscape purposes

Case Studies

- **Magarpatta, Pune:**

Vermiculture Pits & Bio-Gas plants –
Recycling Human Waste

Case Studies

Use of extensive use of Fly-Ash bricks – a waste, by-product of cement production in building construction

Case Studies

- **Magarpatta, Pune:**

Extensive & lush landscaping in the 25 Acre central city green – acts as an Urban Park – the lung of the city

Case Studies

Case Studies

Landscaping, with the theme of *Rutuchakra*, becomes a major physical and visual entity of the overall city planning

- Roads have lush avenue plantation
- Beautiful boundary plantation

Case Studies

Wide roadways were designed for comfortable vehicular access even in peak traffic, as well as giving Pedestrian Priority with wide, comfortable, tree-lined footpaths

Case Studies

“Daffodils”:
Neighbourhoods are named after flowers and are designed for maximising open space, exploring high community interaction, & provide high quality of life

Case Studies

"**Grevillea**":
Composite neighbourhood of 2, 3 & 4BHK units sharing common living amenities like playgrounds, walkways & others

Case Studies

"**Cosmos**":
Large neighbourhood overlooking a large connection of green, open spaces

Case Studies

“<u>Jasminium</u>”:
Large neighbourhood overlooking a large connection of green, open spaces

Case Studies

“Roystonea”

Case Studies

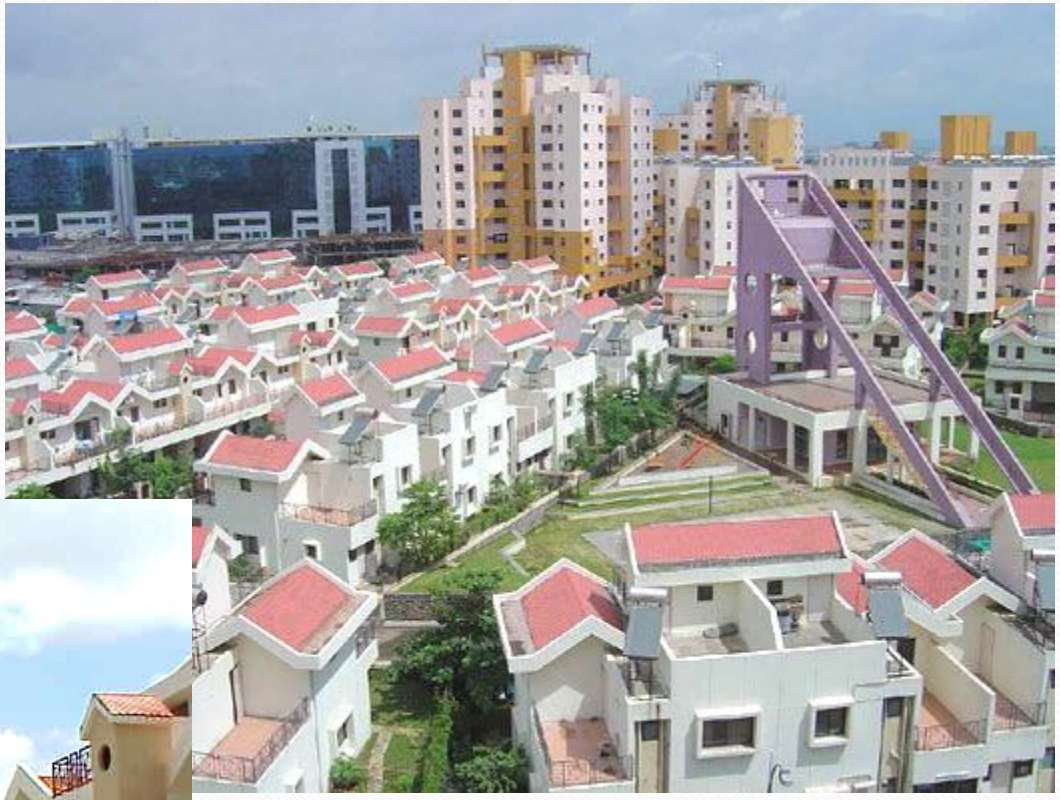
“Laburnum Park”

Case Studies

“Sylvania”

“Trillium”

Case Studies



"**Erica**": Sector of exquisite Row Houses

Case Studies

"**Acacia Gardens**": Sector of exclusively designed garden bungalows

Case Studies

"**Cyber City**": The Central Business District of Magarpatta City

- An IT SEZ was created that boosted IT development in entire Pune
- Workforce generation gave high demand for residences in vicinity
- "Walk-to-Work" idea was implemented
- High Quality buildings gave high real estate appreciation to entire Magarpatta City and even surrounding areas

Case Studies

"**Cyber City**": The Central Business District (CBD) of Magarpatta City

• Uses energy saving Double Skin technology with heat ventilators

Case Studies

"**Cyber City**": The Central Business District (CBD) of Magarpatta City

Case Studies

Other Commercial Buildings:
“The Pentagon 1 &2”
Built-to-Suit office building for John Deere

Built with latest technologies.

Case Studies

Magarpatta School:
A beautiful learning environment with close interaction with nature. Developing responsible citizens and bright minds of tomorrow

Case Studies

A healthy body supplements a healthy mind, and ample facilities are there for physical exercise, sports & recreational play, even Yoga.

Case Studies

City Farming:

Retaining the familiar economy of the land

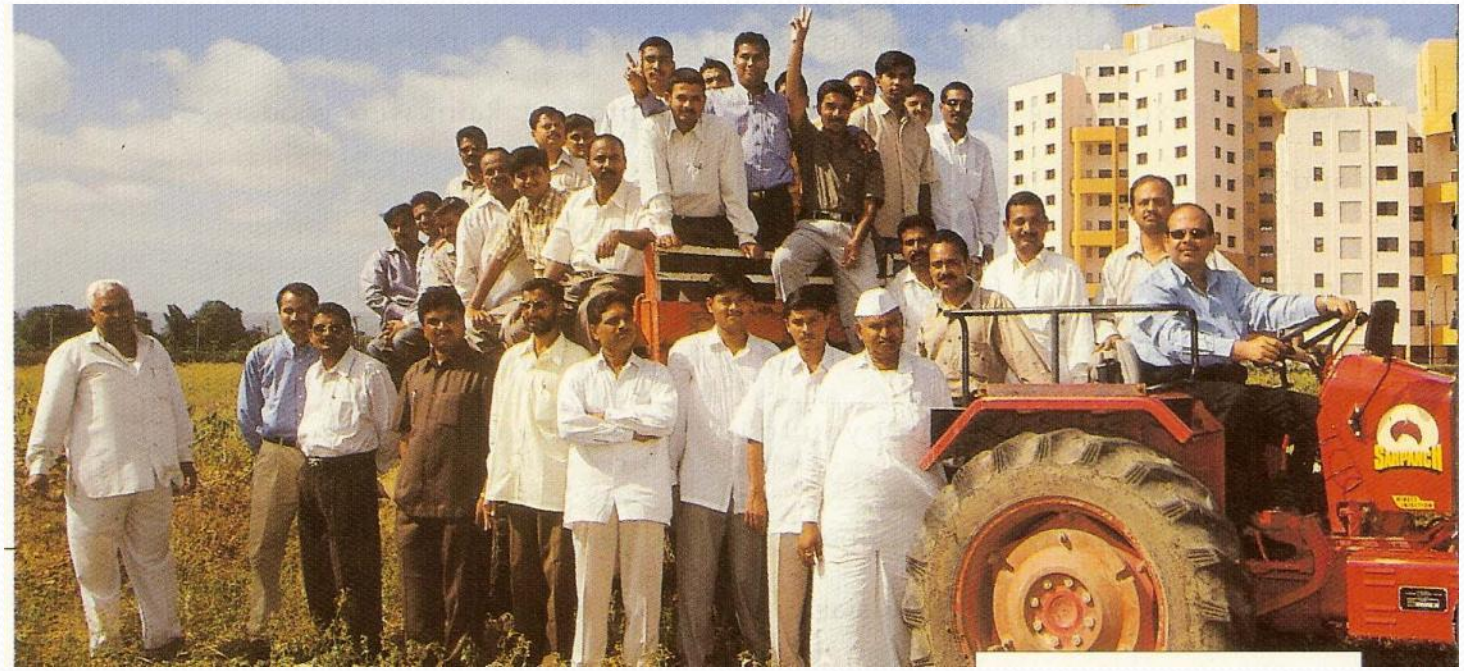
Supplies part of the food demand of the city

Case Studies

Peoples' Participation

Trendsetting land pooling model that made the original landowners actual share & stake holders in the development company

Result: Upgradation in landowners' life



Now referred to as the **Magarpatta Model**

Case Studies: Magarpatta

- SOCIO ECONOMIC EVOLUTION
  - This township has triggered evolution in urban planning.
  - The Government of Maharashtra has passed a special legislation for development of townships.
  - People started pooling their land voluntarily and forming their own developing companies.
  - This has established a different model for urban settlement of workspace and residential in same premises.
  - Migration/Displacement of the original land residents has stopped.
  - The life style of the people staying inside the township has upgraded.

Case Studies

- **Nanded City, Pune:**

STATISTICS:

Population = **1,00,000**

Total Site Area = **700 Acres**

35 Residential Sectors

Almost **20,000** Units

Distance from Pune City
= 12 km (from Station)

Over 200 acres of Green Parks

Case Studies: Nanded City

Case Studies: Nanded City

Case Studies: Nanded City

- Nanded City ..... in tune with nature, is an impeccably planned 700 acre city of futuristic living.

- It is a Residential cum Commercial project created between the rejuvenating environments of Pune Sinhgad Road and the pulsating main Pune City.

- Located at the lake district, Nanded city is the first project in India to take up a huge task of riverbed development stretching over 5.2 kms

- Nanded City offers Apartments, Penthouses, Bungalows and Villas with unimaginable amenities like Boat club, Adventure park, Joggers Park, Horse Riding Tracks, Riverside Greens, Amphitheatre, Swimming Pool, Landscaped Gardens, Nala Gardens, Eco Park, Health and Nature Cure, Solar Energy, Bio Gas and many more lifestyle and environment friendly features.

- Nanded City also provides commercial and institutional zones with state of the art infrastructures for animation and gaming park, IT Park, Commercial offices, showrooms, multiples, mall, restaurant, star hotel and Institutes.

Case Studies: Nanded City

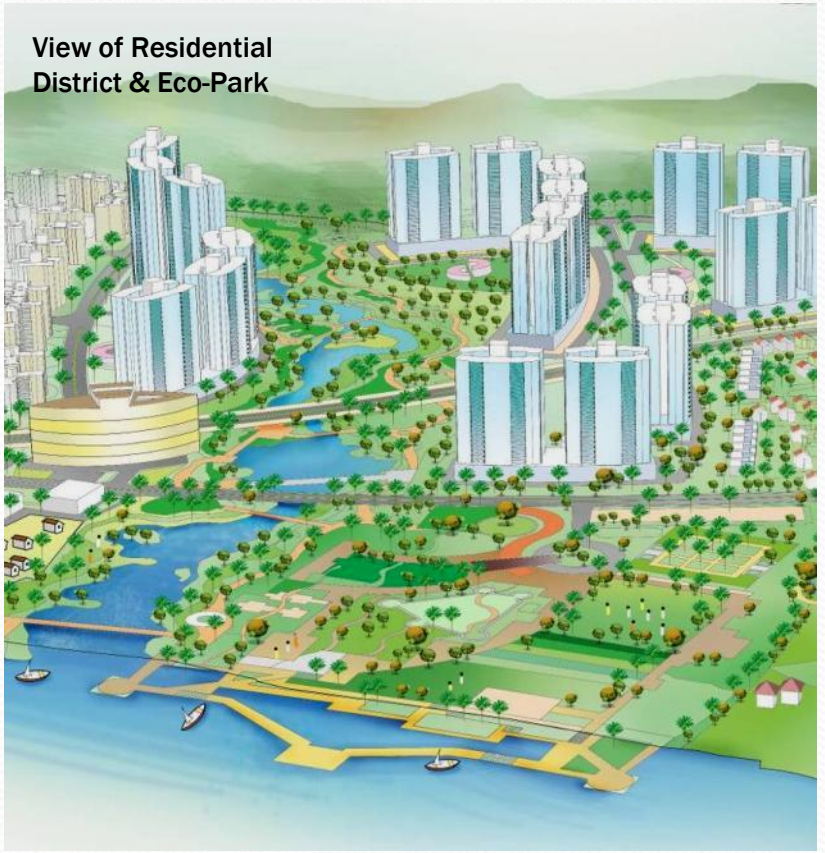
Case Studies: Nanded City

Commercial Towers

Case Studies: Nanded City

High-rise Residential Towers

View of Residential District & Eco-Park



Case Studies: Nanded City

- **Main Features of Green City:**
  - More than 35,000 trees and 1,00,000 shrubs proposed
  - More than 200 acres as public parks
  - 4.5km of Riverside merged with the city eco-system
  - Independent Ecological Study undertaken – Sensitive ecology sites identified and preserved
  - Merging with existing eco-systems - Careful site planning & land engineering works with existing topography & natural features like streams & water bodies.
  - Solar Energy extensively used
  - Strong pedestrian & cycling environment
  - All modern amenities & features

The Kolhapur Context

- **<u>Features of Kolhapur City & Region:</u>**
  - The historic and important city of Kolhapur lies in a beautiful ecological environment
  - The region has various lakes, rivers, hills and forestland. The land is also rich & fertile, making it a major agricultural belt of Maharashtra, cash crop being Sugarcane.
  - The per capita income of Kolhapur's 5 Lakh population is amongst the highest in India.
  - Main River – Panchaganga
  - Main Lake – Rankala Lake

The Kolhapur Context

The Kolhapur Context

Night-time view of Kolhapur on the banks of the Panchaganga in Diwali

The Kolhapur Context

Views of Rankala Lake

Recently, Kolhapur Municipal corporation has built "*Padpath Udyan*" for a lakeside walk – with *chowpatty*, eateries, and public recreation.

The Kolhapur Context

- **Kolhapur as a Gree City:**
  - Kolhapur has the potential to look ahead to change itself into a modern Green City of India.
  - Kolhapur has good intellectual resource, and the financial capital to enforce change in a positive manner.
  - It also has a rich surrounding natural environment, to which it can attach and form an Urban Eco-System.
  - What is required is a planned Action Plan, upgradation of existing Physical Infrastructure, political motivation, financial resource management, and finally, the will & skills of the existing Building Industry professionals.
  - Kolhapur can become a good Green City for Maharashtra!

Conclusion

- Green Cities is a movement. It is also a way of thinking
- There is no 100% Green City, but there are various conscious efforts in each city planning that prioritise on certain aspects and develop them fully.
- A rating system, similar to ones existing for Green Buildings, is needed to acknowledge projects of such size and complexity

Conclusion

- If we Architects, Engineers, Administrative Decision makers, Politicians, allied Professionals, and Public by large, come together to collectively understand these systems in Green Cities, we can surely lay the foundations of a greener tomorrow.

Thank you…